



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **HAYASHI, Noriya**

Group Art Unit: 1712

Serial No.: 09/664,332

Examiner: **Robert E. Sellers**

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**P.T.O. Confirmation No.: 4422**

For. **ENERGY RAY-CURING RESIN COMPOSITION**

**DECLARATION UNDER 37 CFR 1.132**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
Sir:

I, Noriya Hayashi, of c/o Nagoya Research & Development Center, MITSUBISHI HEAVY INDUSTRIES, LTD., 1, AzaTakamichi, Iwatsuka-cho, Nakamura-ku, Nagoya, Aichi-ken, Japan, hereby declare and state that:

- 1) I am the inventor of the above-referenced application.
- 2) I have read the final Office action dated May 28, 2004.
- 3) I have personally conducted or supervised the following experiments.

**Test I (Added Example I)**

Maleic anhydride 0.65 mol was added to one mol of Celoxide 2021P (alicyclic epoxy resin; 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane-carboxylate, manufactured by Daniel Chemical Co., Ltd.) and dissolved by stirring to obtain solution (a).

Blended with 100 parts by weight of solution (a) was 3.0 parts by weight of Sun Aid SI-100L (cationic photo-thermopolymerization initiator; Formula (IV), manufactured by Sanshin Chemical Co., Ltd., 50wt% solvent of  $\gamma$ -butyrolactone), to yield solution (b).

A glass vessel ( $\varnothing$  40 mm x H 50 mm) was charged with (b) so that the liquid height was 40 mm. This was irradiated with UV for 2 minutes. The irradiation conditions were a UV irradiation apparatus: UVL-1500M2 (manufactured by Ushio Denki Co., Ltd.); lamp type: metal halide lamp;

lamp intensity: 120 w/cm; lamp length: 125 mm; in air; at room temperature; under atmospheric pressure; and irradiation distance: 15 cm.

Result: The sample described above was completely cured in several minutes while chain curing.

#### Test II (Added Example II)

The same test as in Added Example 1 was carried out, except no maleic anhydride was added to Celoxide 2021P. (That is, only Celoxide 2021P was used in the solution corresponding to solution (a) in Added Example I.)

Result: The sample after 2 minutes UV irradiation was cured only 1 mm from the surface thereof, and the sample further after 1 hour at room temperature was also cured only 1 mm from the surface thereof, and the remainder was still liquid.

#### Test III (Added Example III)

The same test as in Added Example 1 was carried out, except that 0.01 mol of maleic anhydride was added in place of the 0.65 mol of maleic anhydride in solution (a) of Added Example I.

Result: The sample after 2 minutes UV irradiation was cured only 1 mm from the surface thereof, and the sample further after 1 hour at room temperature was also cured only 1 mm from the surface thereof, and the remainder was still liquid.

#### Test VI (Added Example VI)

The same test as in Added Example 1 was carried out, except that 2.5 mol of maleic anhydride was added in place of the 0.65 mol of maleic anhydride in solution (a) of Added Example I.

Result: The sample after 2 minutes UV irradiation was cured only 1 mm from the surface

thereof, and the sample further after 1 hour at room temperature was also cured only 1 mm from the surface thereof, and the remainder was still liquid.

Table of Test Results

	Test II	Test III	Test I	Test VI
2021P	1 mol	1 mol	1 mol	1 mol
Maleic anhydride	C	0.01 mol	0.65 mol	2.5 mol
SI-100L	3 wt. parts	3 wt. parts	3 wt. parts	3 wt. parts
Thickness of cured layer	About 0.1 cm (The remainder is not cured.)	About 0.1 cm (The remainder is not cured.)	4 cm	About 0.1 cm (The remainder is not cured.)
Determination of Curing at 4cm depth	X	X	O	X

The undersigned declares that all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under ' 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issued thereon.

*Noriya Hayashi*

Signature

Noriya Hayashi

Signed this 20 day of December, 2004